





SoC for Media Oriented Information Appliances

**Information Appliance Product Division
Silicon Integrated Systems Corporation**

November 2002

www.sis.com

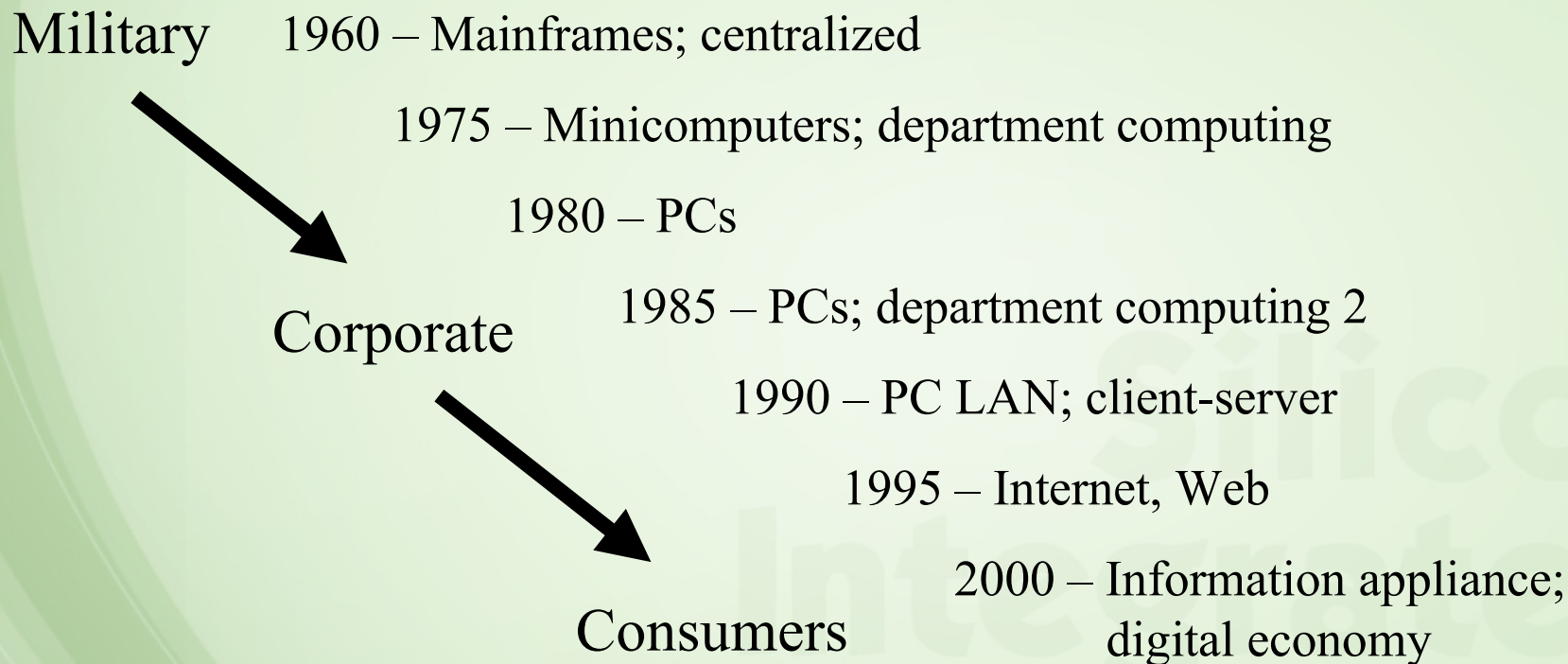


Contents

- IA Overview
- Classification of IA
- Customers' Concerns
- SoC Advantages
- SiS SoC IA Solution

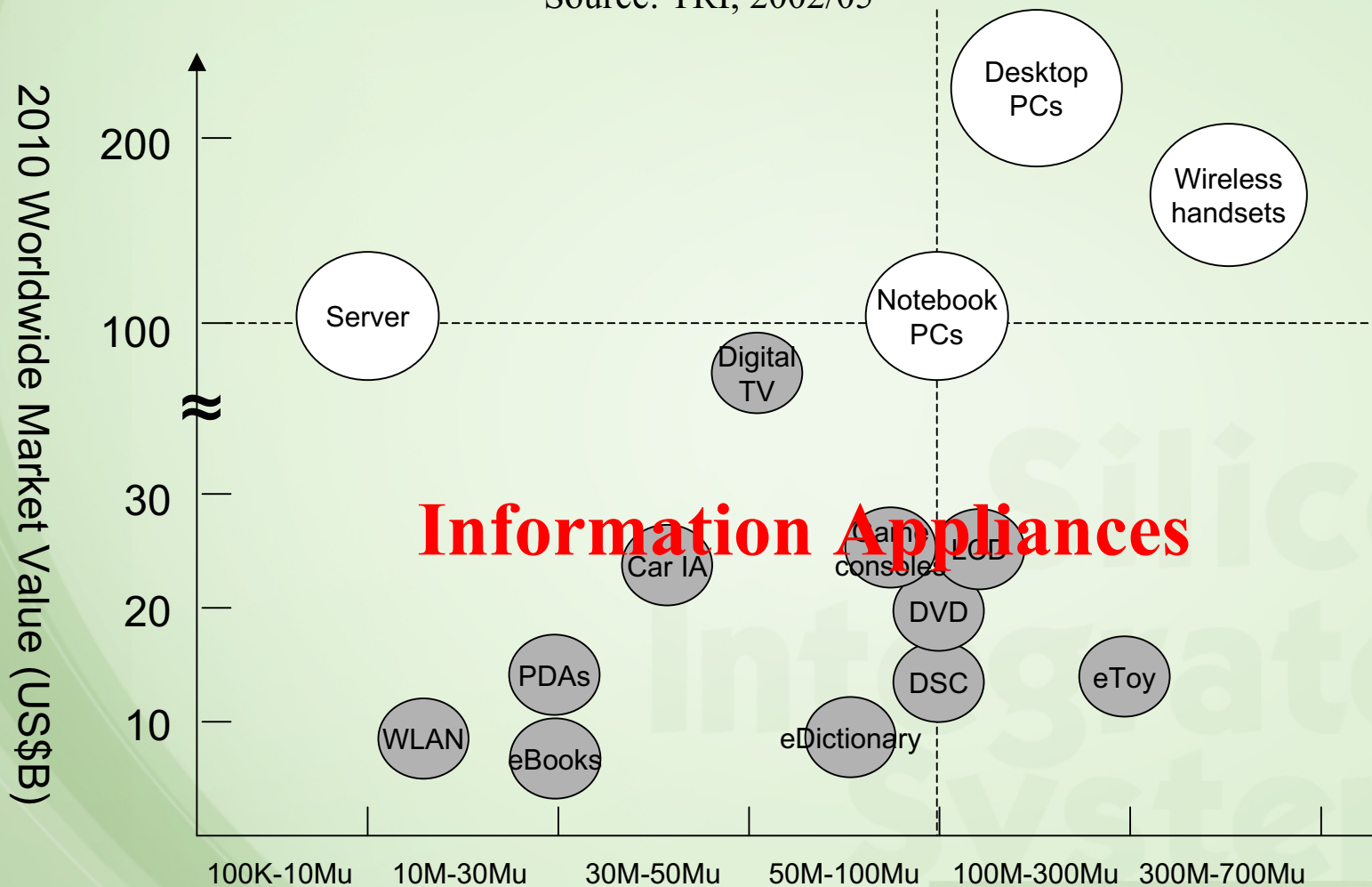
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A Natural Next Wave



2010 Market Landscape

Source: TRI, 2002/05



IT Industry Competition

Source: TRI, 2002/05

Value Chain

Service						
Brand/R&D	Branding Market leadership		IC design System Integration		Branding IC design Product innovation	
Key Components						
Product design	Network capability Product design					
Engineering design			Economy of scale			
Manufacturing						
IT Platform	Super computer	Server	PC	IA	Fashion IT	
Characteristics	System-Centric	Network-Centric	Manufacturing-Centric	Service-Content Centric	Innovation/ Fashion Centric	
Competition model	Large scale integration	Network integration	Disintegration	Integration (SoC)	Integration (simple chip)	
Success factors	High-speed computation	Network performance	Manufacturing scale	Application integration	Innovation	
Leaders	IT leaders	IT leaders	PC leaders	3C leaders	diversified	

The Opportunity

- Most, if not all, of the latest killer applications for the PCs revolve around the Internet.
- Worldwide PC is predicted to grow at **9%** a year for 2002 through 2008 (Gartner Dataquest June 2002)
- The number of people with Internet access is estimated to grow at **20%** a year for 2000 through 2005 (NUA Internet Survey August 2002)
- Non-PC devices (Information Appliances) are expected to fill the “gap”

Definition & Position

IA








- Information is king
- Embedded product; specific use
- Easy to use
- General consumers
- Rhetoric/Portable
- Low power
- Low cost
- Application-centric

PC

- Computation is king
- Open architecture; general use
- Complicated
- Expert users
- Whitebox/Desktop
- High power
- Expensive
- Technology-centric

Not a PC

Classification of IA

Communi- cation	2G mobile phone	2.5G mobile phone	3G mobile phone	Mobile phone w MP3/ Internet	Satellite phone	PDA	PDA w MP3/CD/ Internet	Smart phone
Home	Game console	Internet refrigerator /washer	Digital set- top box, VoD 	Web screen phone 	IA home gateway 	Digital video surveill- ance	Personal video recorder	Electronic album
Vehicle	Multi- media player	Car PC, GPS/ Navigation 			Vehicular gateway	Vehicle surveill- ance	Telematics	
Work Place	Thin client, Industrial PC 	Stock machine, POS, Kiosk 	Tablet PC	Web pad, Smart display 	Industry PC	Palm-size PC	Wearable PC	E-Book



IA Examples

IA Appliances	Network		Low power		Display	Storage	Multimedia	Small size
	Wired	Wireless	Line	Battery				
Gateway devices	X	O	X		O	X	X	X
Set-top boxes	X	O	X		X	O	X	X
PVRs/DVRs	X		X		X	X	X	X
Thin clients	X		X		X		O	X
Web pads		O		X	X	O	O	X
Smart Display	X	O	X	X	X		O	X
PDAs	O	O		X	X	X	O	X
Industry PC, Kiosk	O	O	X		O	X	O	X
Video surveillance	X	O	X		X	X	X	X
Networked Games	X	O	X	O	X	X	X	X
NAS	X		X			X		
Server blades	X		X			X	O	X
X=required; O=optional								



IA Vendors' Concerns

- ✓ Killer applications
- ✓ TV quality video for entertainment in the living room
- ✓ Fan-free, low noise, compact size
- ✓ Price
- ✓ High reliability
- ✓ Booting time

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IA Developer's Concerns

- ✓ Total reference design
- ✓ Software reuse
- ✓ BOM cost
- ✓ Linux & WinCE **platform** solutions
(not only OS but also AP)
- ✓ Technical supports from **SoC** and
platform providers

Minimal time to market

System-on-a-Chip

- ASIC with on-chip processor core, memory, and logic
- A US\$21M market in 2001; forecast to exceed US\$50B by 2006
- Largest application today being digital cellular handsets (US\$6B, 2001; est. US\$13B, 2006)
- Followed by video games, digital set-top boxes, DVD players, etc.

SoC Characteristics

- Best solutions for application specific tasks that require programmability
- Ultimate challenge to a chip designer today
- Not every designer can/is willing to do SoC
 - Tedious works in integration, simulation, verification
- Software and board level counterparts are required to provide a total solution



SoC Advantages

- Compact size
- Low power
- Low system BOM
- Simple board-level design
- Fast time-to-market

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Compact Size

SoC

- SoC 1225 mm²
- Total 686 pins

Not SoC

- CPU 2500 mm²
- Northbridge 1400 mm²
- Southbridge 730 mm²
- MPEG decoder
 1400 mm²
- Total > 1400 pins

Low Power

SoC

- SoC 2~4W

Not SoC

- CPU 1~10W
- Northbridge 5~6W
- Southbridge 3~4W
- MPEG decoder 2~4W

Low System BOM

SoC

- SoC US\$35~50

Not SoC

- CPU US\$25~50
- Northbridge \$10~20
- Southbridge \$10~15
- MPEG decoder \$15~25

Simple Board-Level Design

SoC

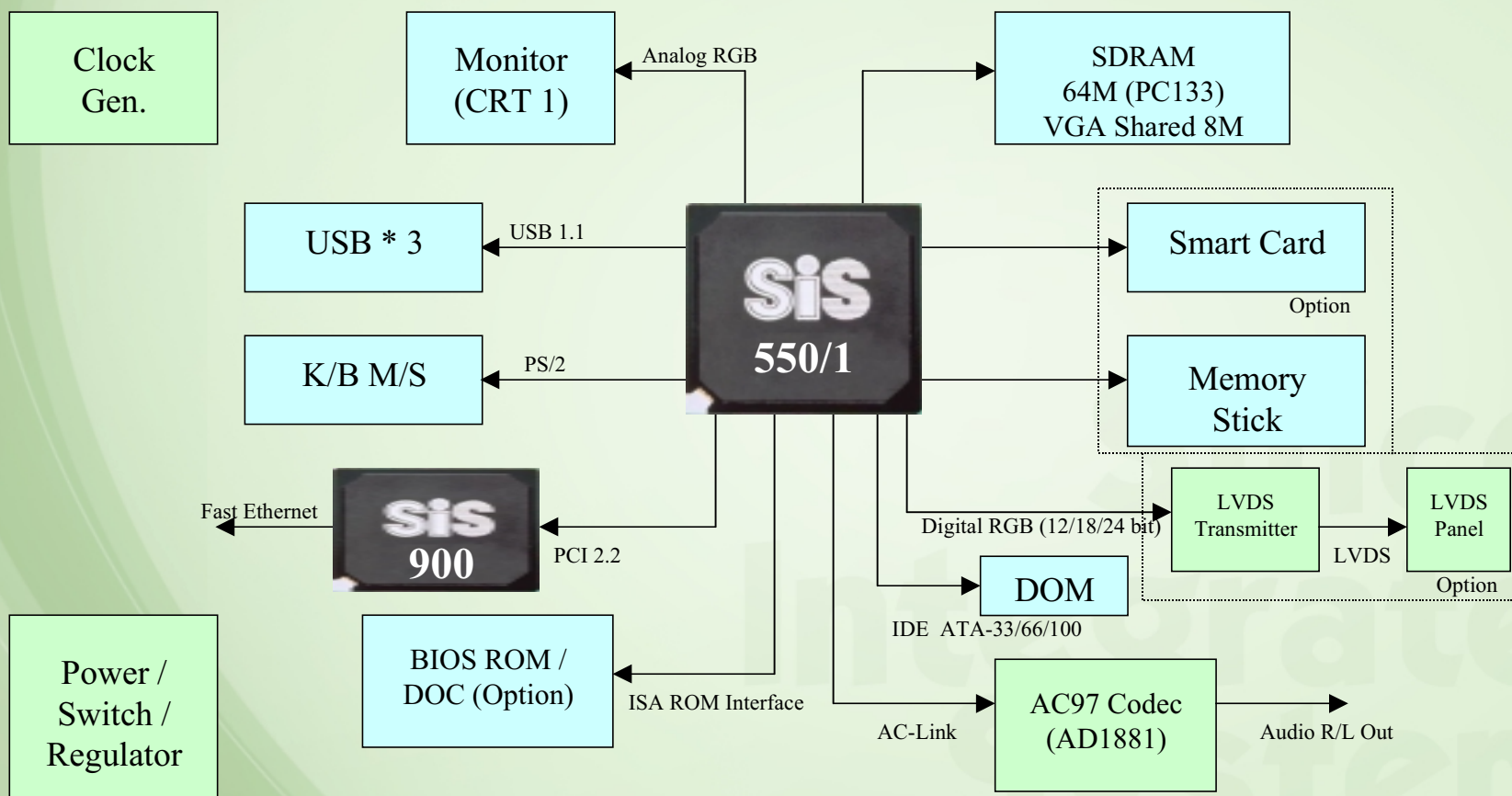
- Easy layout (4-layer PCB)
- Simple thermal design
- High MP yield rate
- High reliability
- Low cost
- Small form factor
- Good battery life for handheld device

Non-SoC

- Hard to layout in 4-layer PCB
- Heat sink + Fan + ...
- Low MP yield rate
- Low reliability
- High cost
- Large form factor
- Hard to design for handheld device

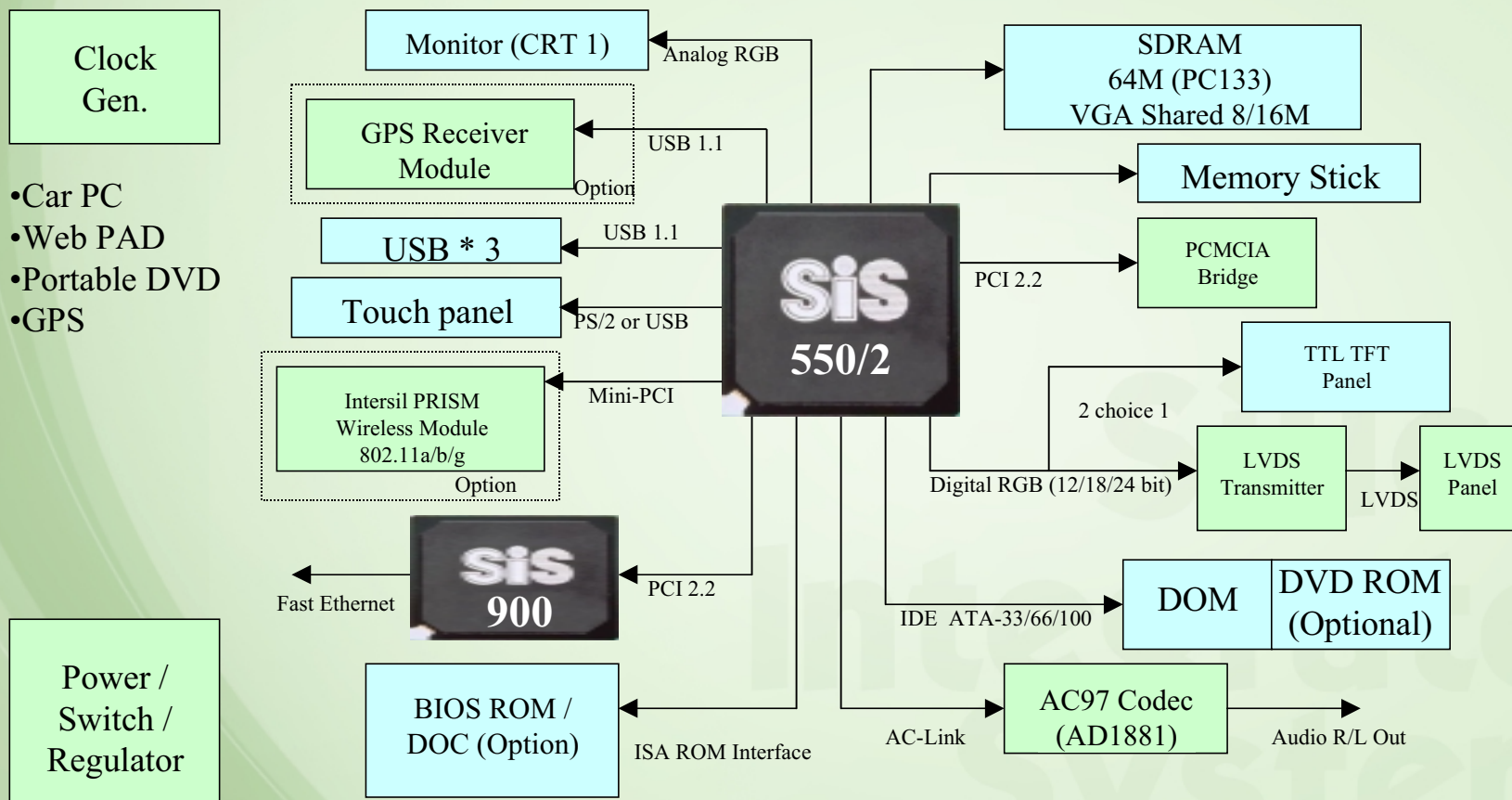
Product Design Example #1

Thin Client



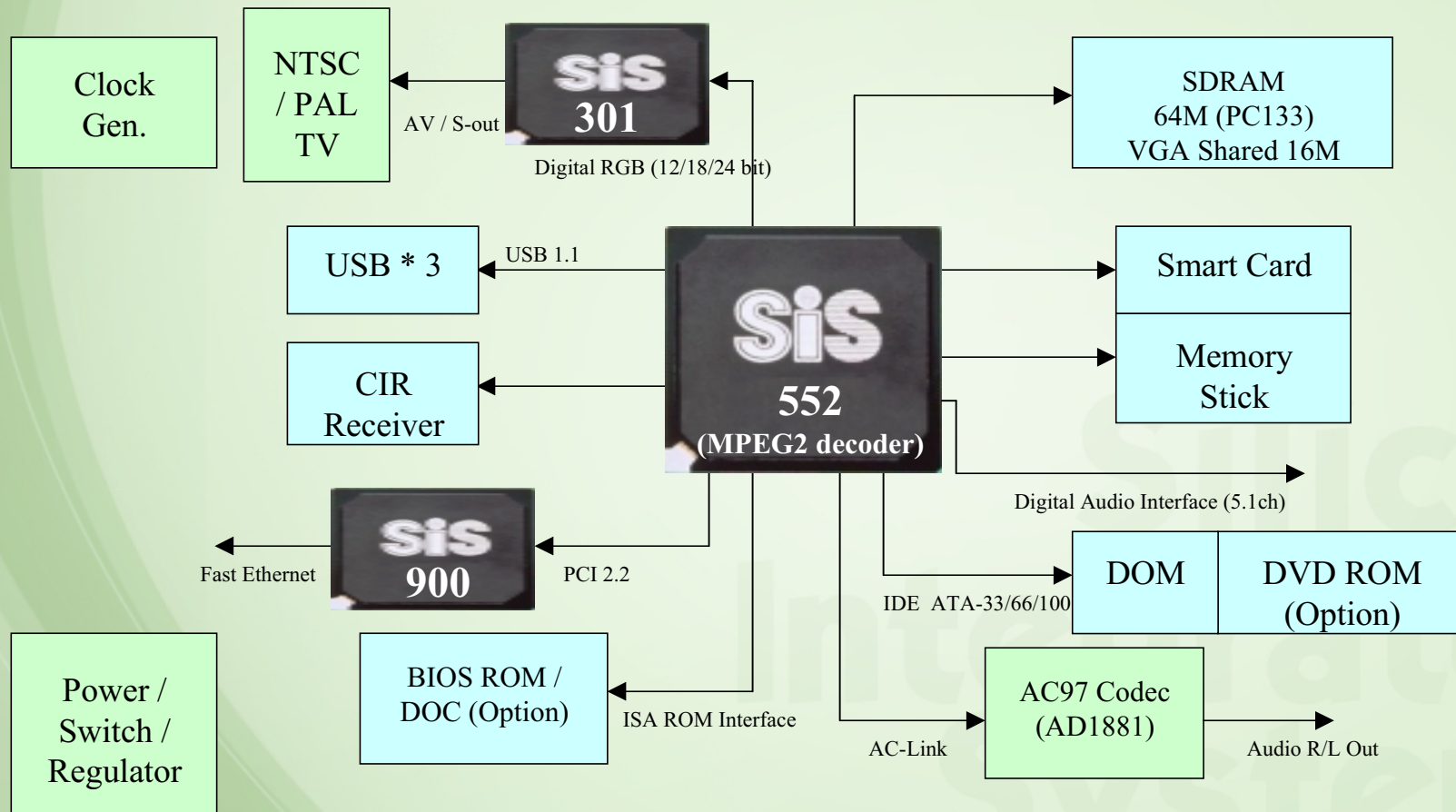
Product Design Example #2

PAD Base Application



Product Design Example #3

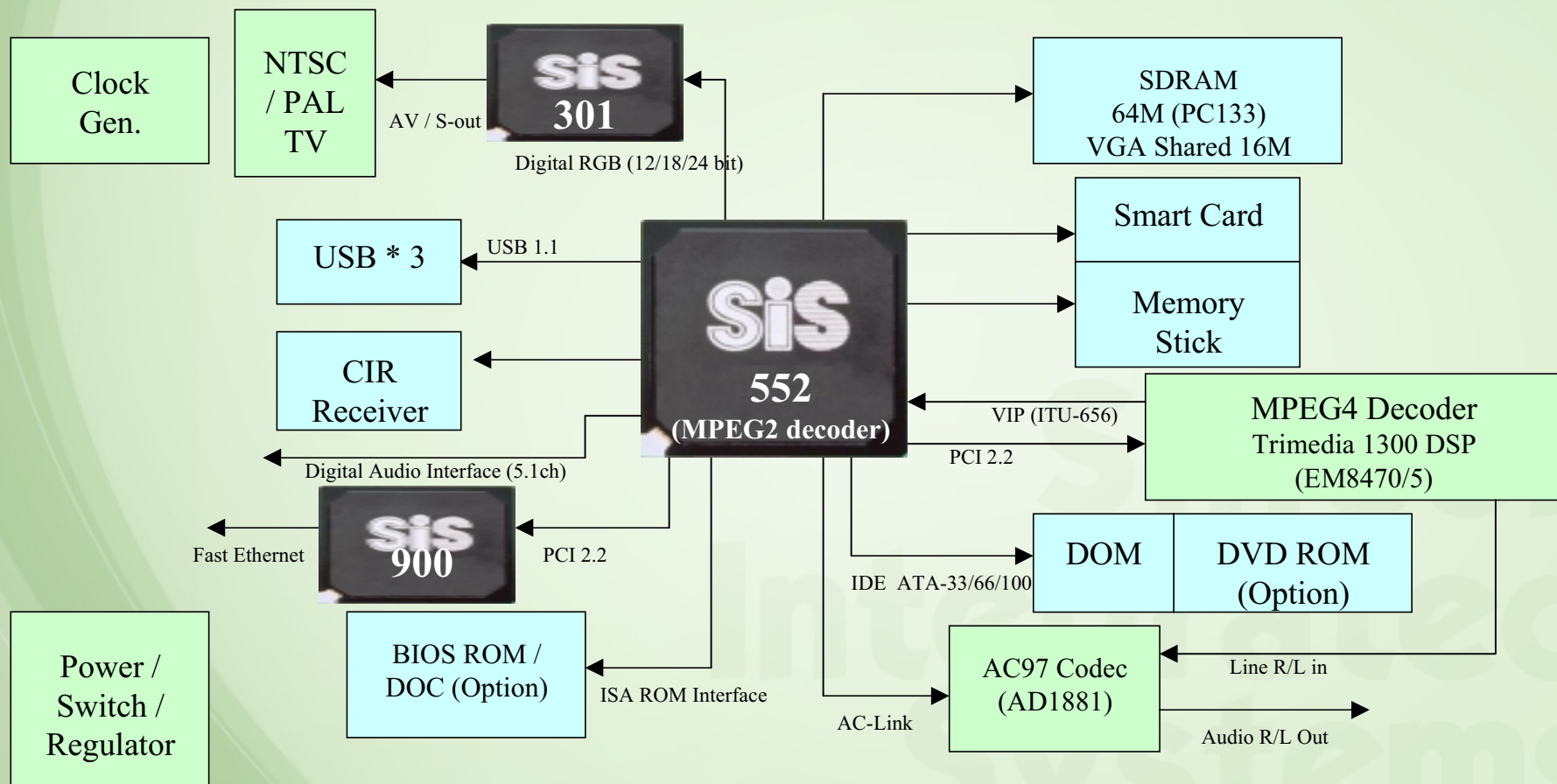
MPEG1/2 IP STB for VOD





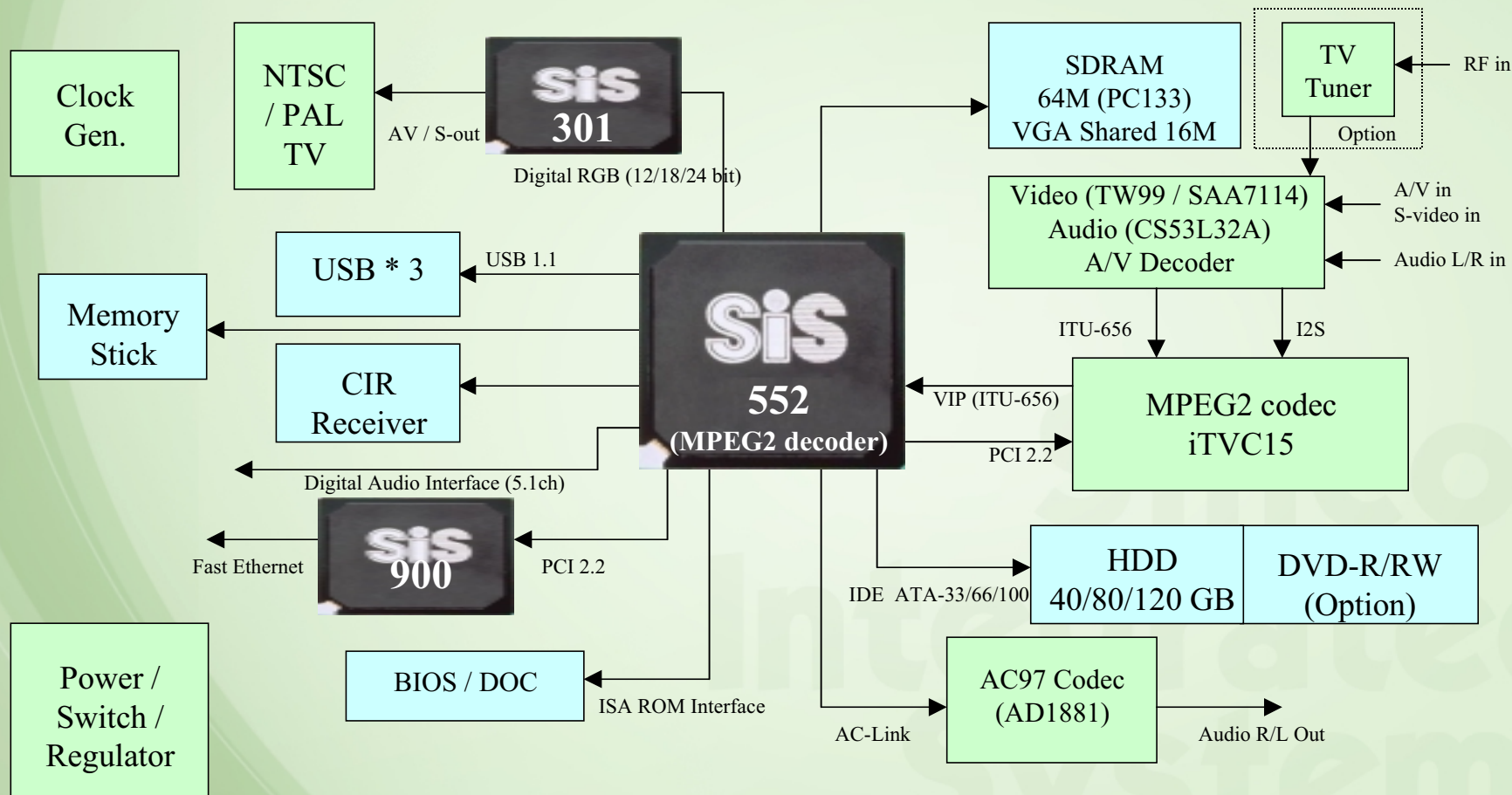
Product Design Example #4

MPEG1/2/4 STB for VOD



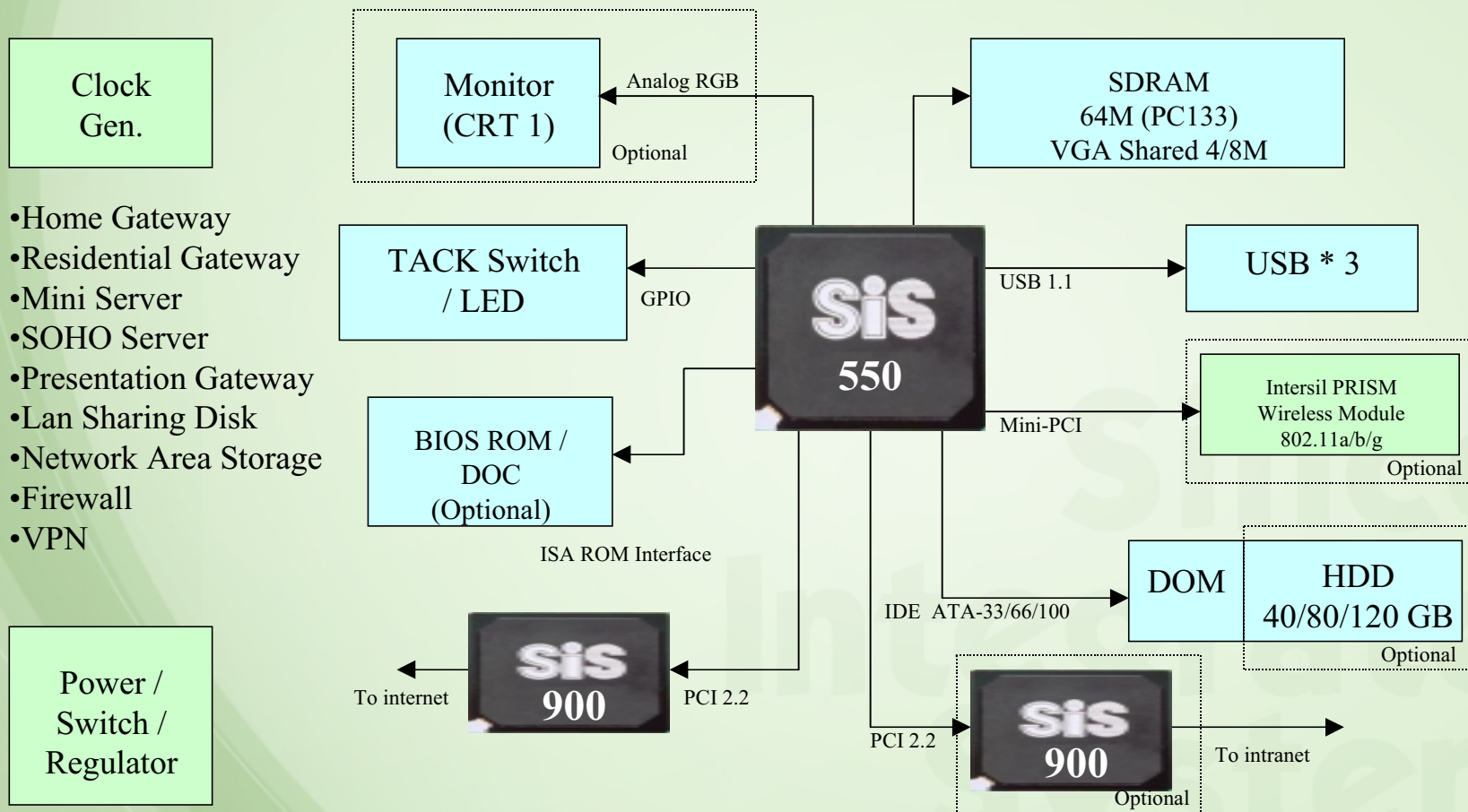
Product Design Example #5

PVR / DVR



Product Design Example #6

Internet Access Application





SiS IA Strategy

- **Provide the total solution HW. (SoC)**
 - SiS55x integrates x86 processor, core logic chipset, communication & multimedia features.
- **Provide the total solution SW.**
 - Device driver support for variety OS.
 - Embedded solution for dedicate customer.
 - WinCE & Linux supported.
 - Small size kernel & window manager
 - Application support customize browser integrated www, mp3, DVD, e-mail...
- **Provide System Integrated Service.**
 - Initially through 3rd-party partnership

SiS IA Total Solution

Hardware

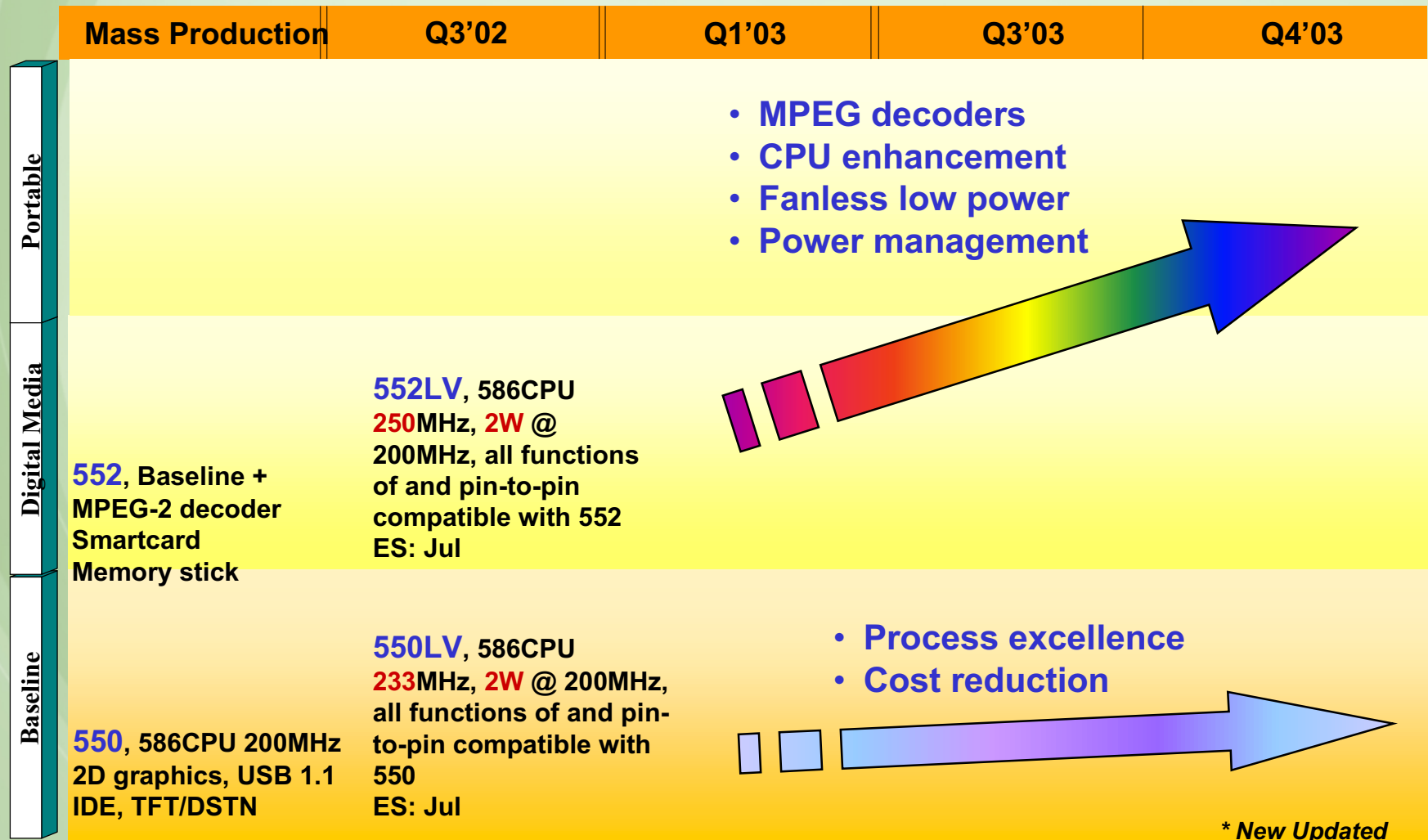
Software



- IP STB, Smart Display
- Thin Client, PVR
- Car PC, Kiosk

- WWW & Email
- DVD, VCD, VOD
- CD, MP3, Game

SiS IA SoC Road Map

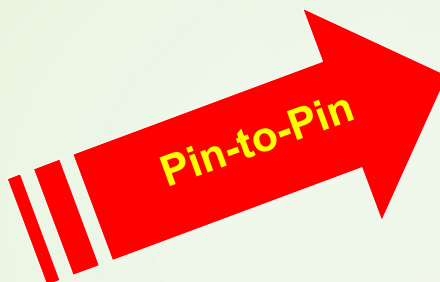


SiS55x Family

Entertainment & Security

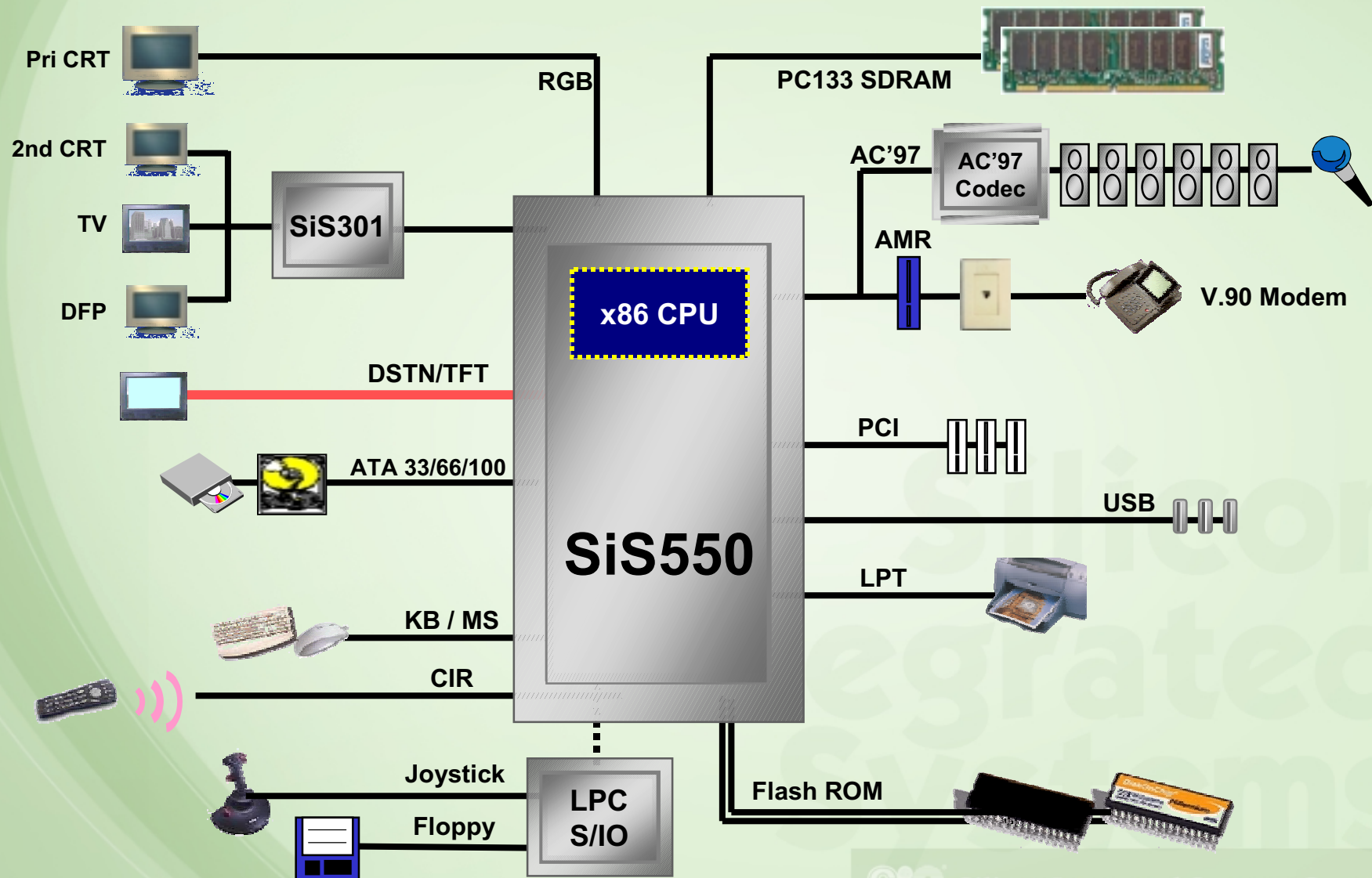


- x86 CPU
- 2D Graphics
- DFP / TV-out
- DSTN
- PCI / USB / IDE
- 6-Channel Audio
- LPT / CIR
- Flash ROM Interface

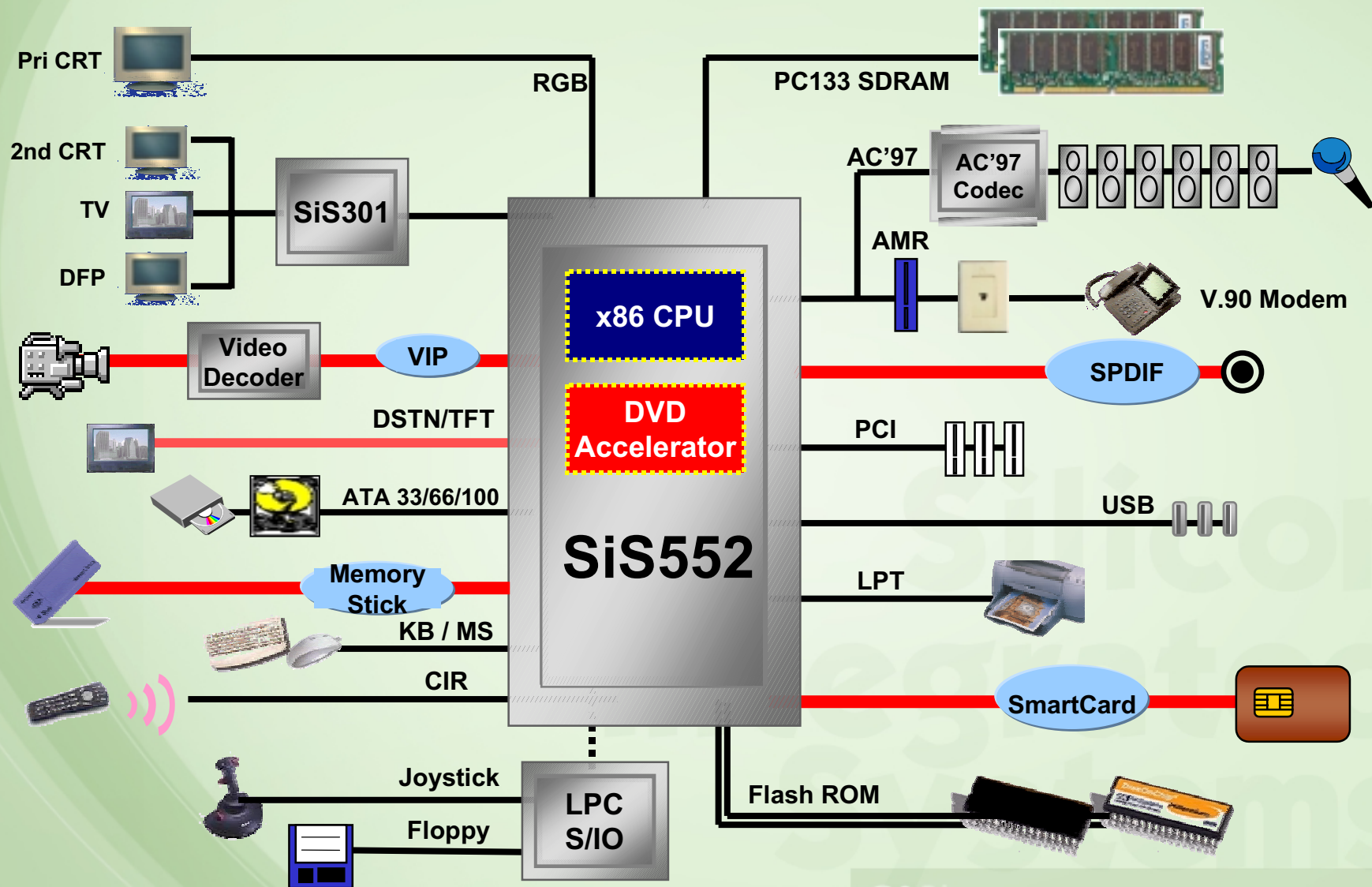


- MPEG-2 Decoder
- SPDIF
- VIP
- SmartCard
- Memory Stick

SiS550 Block Diagram



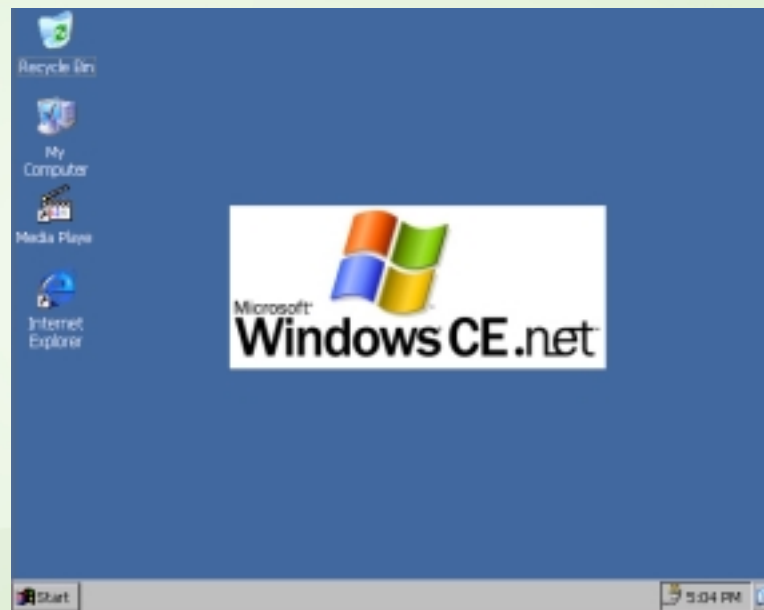
SiS552 Block Diagram



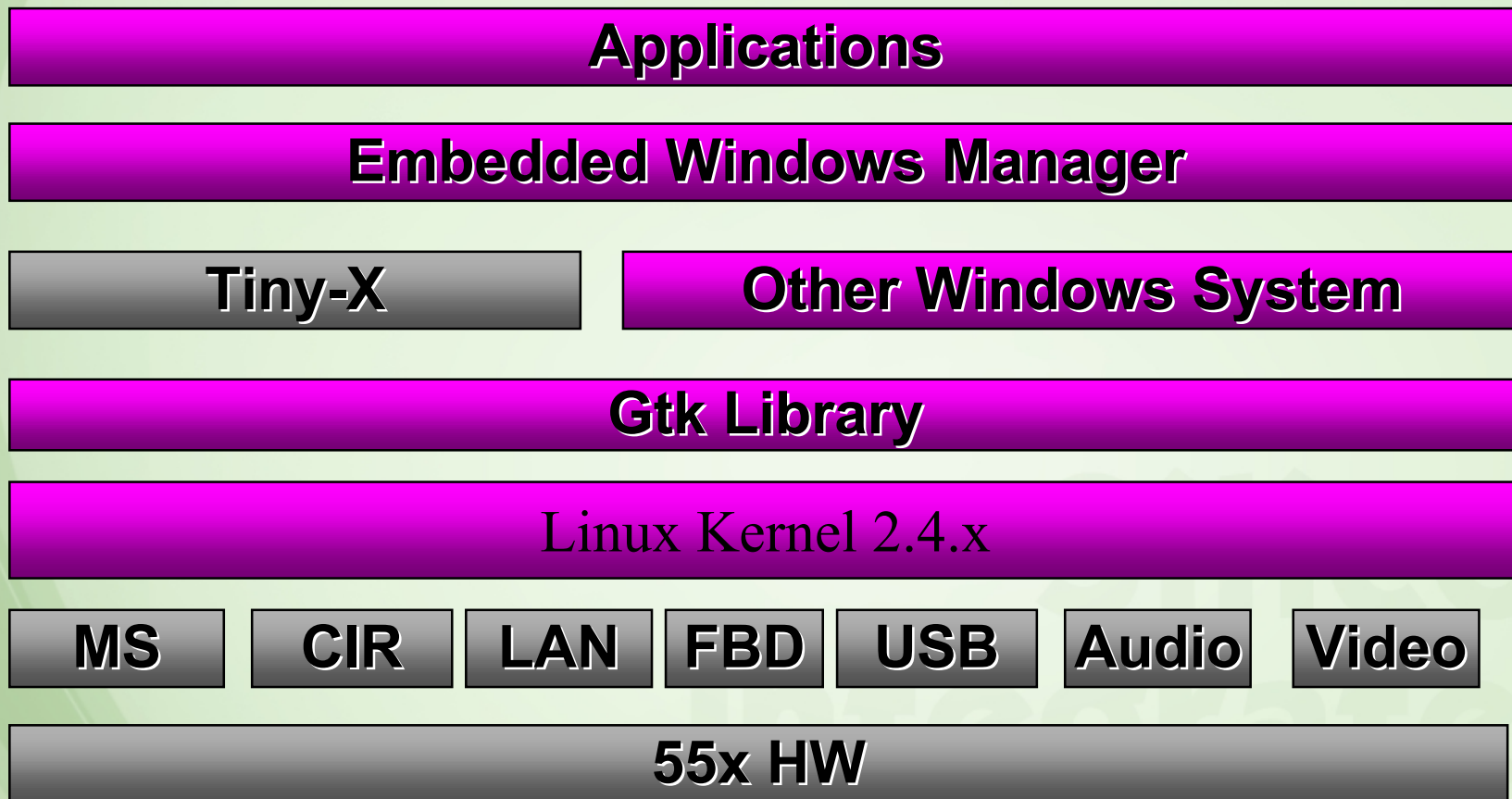
SiS Software Platforms

Linux running on SiS55x

WinCE running on SiS55x



Linux Architecture



SiS



3rd party



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Linux Solution

SiS Linux Package Features:



LinuxBIOS

- SiS created the world first working LinuxBIOS
- Enabling system to boot within 3 seconds



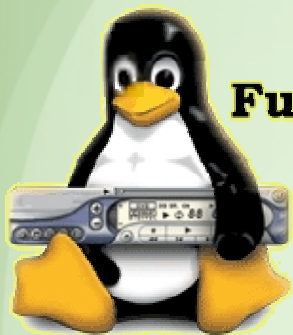
- Kernel version 2.4.2~2.4.19,
- Support 2D accelerated TinyX window
- System bundled in 16MB

SiS Flexibility



- Flexible
- Featuring SiS Linux on DOM, DOC

Linux Solution (cont')



Full Functions

Multimedia

VCD, CD, MP3, Hardware accelerated DVD

Also Featuring **Video On Demand**



multimedia powered by

Web Browser

HTML3.2/4.0, SSL3.0, HTTP1.1 protocol

Java1.1 and Cookie, Multiple language fonts, Chinese Input

Java Script, Java Virtual Machine, Flash 5.0

Email

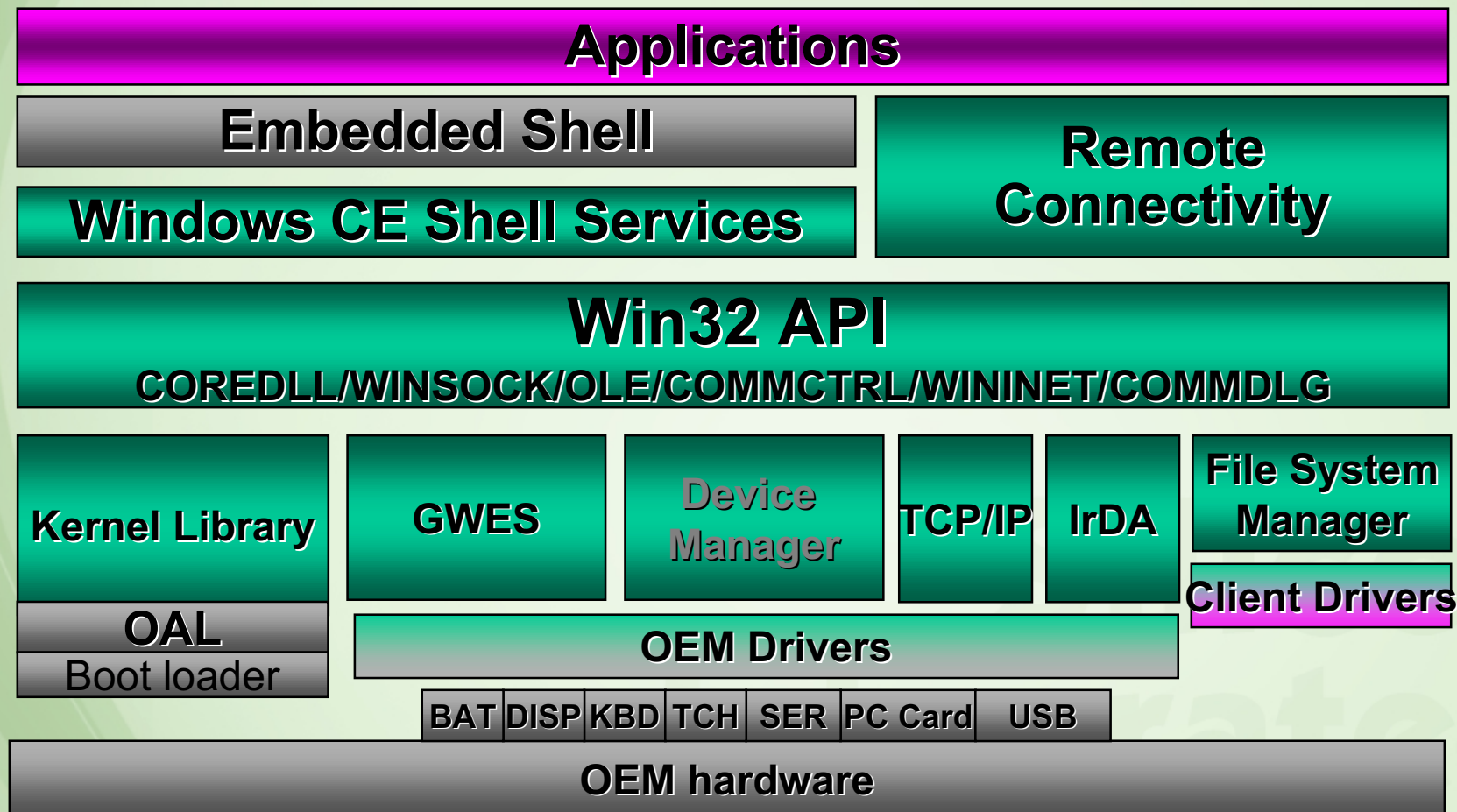
File attachment, Address Book, Multi User, Mail Management

File Management

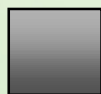
File transfer between various storage devices



WinCE.NET Architecture



Microsoft
(binary)



SiS



IHV
ISV



WinCE Solution

SiS WinCE Package Features:



- Support WinCE 3.0, WinCE.NET 4.1, 4.2
- Provide BSP to reduce customers' developing time
- Support 2D, Direct Draw, Direct Sound, Capture

- SW/HW accelerated DVD player (IVI provided)
- Web Browser, Email, Word
- Featuring SiS WinCE on DOM, DOC

SiS Flexibility



- System Integrator of Microsoft
- Microsoft Windows Embedded Partner



SiS SoC Partners

System Bios

AMI : BIOS provider

AWARD : BIOS provider

INSYDE : Linux BIOS & application provider

Phoenix : Linux BIOS & application provider

S/W System Integrator & Application

Animeta : Embedded Linux solution provider

Avamax : Total S/W solution for Internet access

B2C2 : Professional software solution provider

CYBERLINK : provider of digital video & audio software

Digirose : Embedded Intelligent Vision/Video solution provider



SiS SoC Partners (Continued)

Digital Streaming : Expert of AV digital streaming technology

E-COM : Pioneer of information security system

Gismosoft : WinCE solution provider

Intervideo : Provider of digital video & audio software

Redsonic : Embedded Linux solution provider

Setabox : MPEG-4 streaming expert and multimedia on demand solution provider

SPA : WinCE & embedded Linux solution provider

H/W Manufacturers and Vendors

Advantech : Pioneer of SOM / IPC solution vendor

Apacer : Versatile memory solution vendor

BCM : Module board provider





SiS SoC Partners (Continued)

H/W Manufacturers and Vendors

G-Card : Module board provider

ICOP : IPC & module board provider

M-Systems : Leading flash disk manufacturer

Sony : Memory Stick developer

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SiS Advantages

FAST Time-to-Market

Coordination for turnkey solution including H/W, S/W, BIOS, applications.

Mature PC Chip Set, IA SoC Experiences

Highest level of integration of proven technologies

Commitment

All-out efforts and good reputation in the SOC field

Close Partnership

Software, hardware solution and system providers

Low Cost

Silicon fab and process technology

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Appendix

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SIS550 VS NSGX1

	SiS SOC 550 200MHz	NS GX1 200MHz
CPUMark99	7.18 (135%)	5.82 (100%)
Sandra 2001 CPU Dhrystone	396 MIPS (175%)	226 MIPS (100%)
Sandra 2001 FPU Whetstone	206 MFLOPS (159%)	129 MFLOPS (100%)
Sandra 2001 Integer MMX	556 it/S (187%)	297 it/S (100%)
Sandra 2001 FPU MMX	159 it/S (289%)	55 it/S (100%)
Wintune CPU Integer	455 MIPS (162%)	281 MIPS (100%)
Wintune CPU Floating Point	198 MFLOPS (153%)	126 MFLOPS (100%)



SiS550 VS SiS550LV VS GX1

	SiS 550 200MHz	SiS 550 LV 266MHz	NS GX1 300MHz
UnixBench 4.1 final score	35.9(100%)	46.9(131%)	35.8(100%)
Nbench 2.1(compiler:gcc2.7.2.3) memory index	0.81(145%)	1.04(186%)	0.557(100%)
Nbench 2.1(compiler:gcc2.7.2.3) integer index	0.897(128%)	1.185(170%)	0.697(100%)
Nbench 2.1(compiler:gcc2.7.2.3) floating-poing index	0.901(146%)	1.159(187%)	0.617(100%)

Test condition:

- (1)SiS SOC 550 CPU 200MHz SDRAM 133MHz
- (2)SiS SOC 550LV CPU 266MHz SDRAM 133MHz
- (3)NS GX1 CPU 300MHz SDRAM 75MHz (up to 75MHz)

OS : Linux 2.4.18
VGA : 800*600 High Color (16 bits)
share memory :4MB



SIS550 VS Geode™

	SiS 550 200MHz	NS SC1200 266MHz	NS GX1 300MHz
Maths-Mark	16.7 (145%)	12.0 (104%)	11.5 (100%)
Graphics 2D-Bitmaps	28.6 (493%)	6.8 (117%)	5.8 (100%)
2D Graphics mark	51.9 (251%)	19.8 (96%)	20.6 (100%)
MMX- Mark	23.5 (284%)	10.4 (116%)	8.9 (100%)
Memory Mark	18.5 (111%)	13.5 (80%)	16.7 (100%)
3D Graphics Mark	4.1 (107%)	3.6 (94%)	3.8 (100%)
PassMark Rating	20.0 (125%)	12.4 (77%)	15.9 (100%)

Customers' Products (1)

Thin Client (SiS550)

- Linux-based Terminal
- Data Security
- Virus resistant



Projector Gateway (SiS550)

- Ethernet or 802.11b to PC
- Immediate slide show
- May be built into projectors w Bluetooth mouse, keyboard
- Access Point



Customers' Products (2)

Satellite STB (SiS552)

- MPEG1/2/4 streaming
- Ethernet hub/switch



CarPC (SiS552)

- GPS + mileage recorder
- DVD , GSM



Customers' Products (3)

SOM (SiS550)

- Embedded PC
- All functions



Disposable PC (SiS552)

- Ultra low cost
- Full PC experiences



Customers' Products (4)

Video Phone (SiS550)

- H.263, TCP/IP-based
- Web Camera
- 64Kbps/15fps



ATM (SiS552)

- Financial Machine
- Smart card



Customers' Products (5)

Kiosk (SiS552)

- LCD PC
- Touchscreen
- DVD



Embedded Computer (SiS550)

- Network computer
- 4 Switch HUB



Customers' Products (6)

TV BOX (SiS550)

- Connected to TV
- Compact Flash Card
- Display picture



Biometrics Machine (SiS550)

- Web camera
- Facial identification



Customers' Products (7)

Home Security (SiS550)

- GPIO for Control
- Compact Flash Card
- Connect to ADSL or Cable



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